# SCIENCE NEWS-LETTER

*The Weekly Summary of Current Science*

A SCIENCE SERVICE PUBLICATION

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## STALLING THE STALL

### Handley-Page Slotted Wing on U. S. Navy Plane

(*See page* 179)

*Vol. XIII* *No. 363*

IT used to be that every youngster wanted to drive a roaring locomotive at 60 miles an hour, or at least be the motorman of a street car. Now with millions of automobiles on the nation's highways, these wishes for thrill and speed have come true.

Today all boys envy Lindbergh and most of them select, at one time or another, aviation as a career. Model airplanes constructed by the thousands are making young America air-minded. Most of the aviators who are flying the air mail, the commercial and the military aircraft of the country are young. Radio, which achieved its place in the living room by dint of the enthusiastic labors of school-boy amateurs graduated into radio engineers, is also a young man's vocation. The conquests of the air and ether will continue.

The days of heroic deeds in aviation are not yet past, but the risks of pioneering the air are being reduced. Thousands of airplanes make regular scheduled trips to and fro with the calmness of routine operation. Aerial taxis will carry you from city to city with nearly as little prearrangement and excitement as the auto trip from hotel to flying field. Airplanes now wear numbers just like automobiles and some business men own and drive their own.

Nevertheless the airplane is not yet perfect and the engineers and pilots are not yet satisfied. Bigger and better airplanes are being built; but in addition to the mere increase in scale and quality, new principles are being introduced in aviation. Some of the new ideas for safer and better aircraft are told in the article on page 179.

Giant airships will cross oceans, new air tracks across continents and oceans will be blazed, new feats of endurance will be headlined this summer. Less spectacular, perhaps, but more important, may be quiet tests in aeronautic laboratories and aircraft factories. Slowness in landing and taking off may not inspire public applause, just as a demonstration of superior brakes on automobiles cannot compete with speed races. The less thrilling events may contribute more to the advancement of the science.

*Editorial*

*Science News-Letter, March 24, 1928*

IN the weeks to come, the SCIENCE NEWS-LETTER will present several new and interesting features.

The issues of April 7 and 14 will be *travel* numbers. The scientifically inclined tourist will be able to use these issues as supplements to the more conventional guide books.

Europe will be the subject of the issue of April 7. Museums, archæological sites, diggings for remains of early man, observatories, scientific shrines, volcanoes and other places of interest because of scientific associations will be listed and described.

America will be the subject of the issue of April 14. National parks with their geological and biological wonders, industrial plants, museums, and other places will be listed and described.

*Readers are invited to send information on little-known places of scientific interest that should be noted in these issues.*

Specimen copies of the SCIENCE NEWS-LETTER (the travel issues if you say so) will be sent to friends of readers, without charge, if names and addresses are listed and submitted to Subscription Department, SCIENCE NEWS-LETTER, 21st and B Sts., Washington, D. C.

*Editorial*

*Science News-Letter, March 24, 1928*

## *In This Issue—*



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INTERPRETING week by week, the latest developments in the various fields of science, this magazine attempts also to present its articles in the most pleasing and readable topography and the most convenient arrangement.

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All of the resources of Science Service, with its staff of scientific writers and correspondents in centers of research throughout the world, are utilized in the editing of this magazine.

Special articles by *eminent authorities* appear frequently.

The reader can keep up with the new books by reading the *brief book reviews* that appear in each issue.

The great *classics of science* are reprinted and interpreted in order that the present generation may appreciate the long and interesting history through which science has evolved.

*Science News-Letter, March 24, 1928*

# Novel Airplanes for Safe Flying

*Aeronautics*

*THE WINDMILL-LIKE wings of the Autogiro will help prevent stalling of the plane, according to the inventor, Senor de la Cierva. A number of these have been constructed, and have many successful flights to their credit*

By Watson Davis

"Quit stalling!"

Good advice to airmen, but it is hard for them to follow it. The airplane, as now built, despite the vast advances made since the pioneering days, has one inherent fault that, in the hands of the inexpert pilot, makes it more dangerous than the automobile, motor boat, railroad train or other means of travel. It will "stall." Pushed to climb too fast, throttled down in speed too quickly, it will lose its "lift," its ability to stay in the air. It tends to get out of control, and unless skilled hands attend it, a crash may occur.

To make airplanes safe has been the ambition of aeronautical engineers. Making the stall less probable and frequent is one step toward greater safety. As airplanes have improved in design in recent years the stall has become less of a factor in the accident record. The latest standard design models are much superior to those of a few years ago and are often controllable under conditions that would have spelt disaster in past years. Engineers have tried many schemes and devices to make the stall less dangerous and the path of aeronautic progress is strewn with such interesting and abandoned experiments.

From the Handley-Page aircraft factory in England there has come the "slotted wing," automatically controlled, that is hailed by some as "the greatest advance in airplane design since the Wright brothers flew." This improvement allows an airplane to be maneuvered under the control of the pilot when, without the slots, the airplane would be stalled and uncontrollable.

The slotted wing, manually controlled, was also developed by the German aeronautical engineer Lachmann and a slot anti-stalling device has also been devised in the laboratories of the Royal Air Force in England.

Another piece of apparatus for making stalls in ordinary airplanes less likely is the Savage-Bramson anti-stall gear, also a British invention.

Queer-looking airplanes have come out upon the flying fields in an effort to conquer the conventional craft's instability. An English craft, tailless, looking like a giant prehistoric flying reptile, the pterodactyl, has shown ability to overcome the nightmare of every pilot, the "stall." From out of Spain has come de la Cierva's autogiro, an airplane that has a windmill for wings and achieves slow speed and steep descent. Here in America a craft like the autogiro in principle is being tested, and also an airplane built on the lines of a gull is being put through its paces.

These are "freak" airplanes. But they are called that in the same way that Langley's pioneer flying machine and the machine used by the Wright brothers at Kitty Hawk were freaks in their days.

As every schoolboy knows, the airplane is kept aloft by the "lift," the pressure or suction on the wings that is created when the airplane is driven or pulled through the air by the propeller. Given enough power, the saying goes, it would be possible to make a barndoor fly. Before the airplane can be sustained in the air it must have gained enough speed to produce this lift. Therefore, the craft must get a rushing start on the ground and it must maintain speed in the air.

In the fact that speed must be maintained in order to support the craft lies most of the danger of flying. And, contrary to popular opinion, engine failure is not usually the cause of the crashes. It is quite possible for a pilot to cut off his engine and bring a plane to a safe landing, provided he has sufficient altitude.

The most dangerous situation develops when the speed reduces below a certain point and the airplane "stalls." This usually happens like this:

In order to climb, the pilot points the nose of the airplane upwards. If he attempts to force too steep an ascent, a passenger watching the speed indicator would see it drop from the 100 miles an hour down to 80, then 60, and then, depending upon the characteristics of the airplane, the speed will be reduced to such a point that the pilot loses all control, the control stick is useless, the airplane slips backward, and if at a low altitude, nearly inevitably falls to earth, with disastrous results. If the stall occurs at a height of 1,000 to 2,000 feet, the pilot can usually regain control by flopping the airplane over on its side and diving it nose down until it picks up sufficient flying speed to regain lift and stability.

Most of the disastrous stalls occur just a few seconds after the airplane has left the ground when the plane is attempting to gain altitude. Or an accident may occur during a forced landing due (*Turn the page*)

## Airplanes—*Continued*

to the high speed necessary to avoid a stall in attempting to fly over some object adjacent to a closely confined landing area.

This failure of an airplane to control normally when its speed is reduced below its "stalling speed" is inherent in most usual designs of airplanes. In spite of its growing application to the carrying of mail, passengers and other services of the commercial world, the airplane is primarily a product of the Great War. The urgent needs of those days hastened the development of aeronautics through its adolescence and even now the principal outlets of aircraft factories are the military departments of the various governments. And safety, stability, ease of handling are not always sought or even welcomed in armies and navies when, in order to attain these improvements, it may be necessary to sacrifice speed, maneuverability or some other quality that is important in combat flying. Infant air transport companies, struggling to get established, have had to use the airplanes already pioneered. It is not surprising, therefore, that experiments to improve aerodynamic safety have been few and often without adequate financial support.

From out of the aerodynamical laboratories, with their wind tunnels, delicate instruments and experimental flying fields, there has come knowledge that has allowed amazing economies and improvements in design of airplanes. For instance, the experts of the National Advisory Committee for Aeronautics have found that a round wire the size of the tiny lead of an ordinary pencil has just as much resistance, or "drag," as a large wooden strut, nearly as big as a man's wrist, that is properly streamlined. Wings tested in the rushing air of a wind tunnel have allowed the determination of the best designs for various sorts of airplanes. Thousands of tests upon models, checked by full-sized performance, have placed in the hands of physicists and engineers the data with which they can create new designs of airplanes.

One of the most promising of the many devices for safer and better airplanes is the Handley-Page automatic slotted wing, illustrated on the cover.

An unobservant layman viewing an airplane fitted with this device would not notice anything very different about it at first glance. Then, if called to his attention, he would see small additional wings or slats attached to the front edges of the wings. These do the trick. The experts call them "auxiliary airfoils." In normal position they fit closely against the leading edge of the main wing and become a part of it. But if the wing during flight loses its lift due to a stall, these slats move forward away from the leading edge of the main wing and allow the formation of a slot, a magic slot, in the wing. The air rushing through the slot is directed along the back of the wing, thus restoring the circulation over the wing and sweeping away the useless eddies which had started to form and destroy the lift. Loss of lift in a stalled airplane comes about through the fact that the air rushing over the wing fails to follow and hug the top surface of the wing. The slot is effective partially by speeding up the rush of air by its small opening and partially by deflecting the air against the wing surface.

*THE PTERODACTYL, Capt. Hill's tailless airplane, which looks for all the world like a prehistoric flying lizard. This picture shows it in flight*

The first type of slotted wings was not automatic, but just at the point of stalling the pilot had to throw the slotting device into action manually. Then a clever engineer at the Handley-Page plant discovered that the slats would open themselves just as the airplane was about to go into a stall if they were hinged freely. The lift upon them exerted by the airflow over the stalling wing sets them into action. So the automatic slotted wings were invented.

The automatic slots change the character of the airplane's wing, just as though suddenly in midair without the knowledge of the pilot a force of flying mechanics had mysteriously replaced the standard set of wings with a pair that is fit for flying at a greater angle. Some pilots object to the fact that this change is made automatically without action on the part of the pilot and often without his knowledge. Other aeronautical specialists point out that the slots are not a cure for the stall, but just cause a postponement. They save the airplane from stalling at one angle, but if the airplane continues to point its nose upward or decrease speed there will come a point when the machine stalls in spite of the slots.

The past few years have seen a variety of devices designed to change the character of the airplane wings and thus prevent the stall. In one arrangement the wing of a monoplane is made in two sections, so that it can be separated in the air and converted into a sort of biplane. Wings have been so constructed internally that their outside camber can be varied, thus changing the lift and drag.

A rotating cylinder was placed at the front of the wing so that it could be revolved and influence the wing much on the same principle as the rotors of the rotor ships. Jets of compressed air have been sprayed over the top of the wing to check the "burbling" or boiling of air that contributes to the stall. Or air is sucked in to enable a decrease in lift when desired. Many of these devices have gotten no farther than the wind tunnels of test laboratories, but others have been placed on experimental machines.

One device for preventing the stall that is in actual use is more of a warning than a prevention. The Savage-Bramson anti-stall gear, actuated by a vertical rudder, gives a warning to the pilot that his airplane is about to stall by jerking the control stick gently, telling the pilot to nose his airplane down slightly to safety.

Some airplanes of the future may not look like the familiar craft of today's skies. A few years from now we may see a skyscape like an artist's restoration of the ancient Jurassic era, some 150 million years ago, when giant flying reptiles filled the air. Giant tailless mechanical beasts, a new breed of gigantic flying lizards, may be the airplanes of tomorrow.

After the war a (*Turn to page* 187)

# Corona Photographed in Daylight

*Astronomy*

Long and expensive expeditions of astronomers to distant parts of the earth to photograph the fleeting phenomena of a total eclipse of the sun may be avoided in the future. The sun's corona, which, until now, has only been observable when the moon obscures the bright solar disc, is now claimed to have been photographed in full daylight by Dr. G. Blunck, German astronomer.

In the past many experiments have been made by astronomers to achieve the photography of the corona without waiting for an eclipse, but they have all failed. For ordinary colors the brightness of the corona is just about the same as that of the sky itself around the sun, so that photographs cannot show where one stops and the other begins. The sky itself gives off light largely of blue and the shorter, invisible, ultra-violet, while a large part of the corona's light is in the red, and the longer wave, invisible, infra-red. Accordingly, efforts have been made to take the corona's picture with red, or infra-red, light. So far, these have also been unsuccessful.

Dr. Blunck explains that the reason for these failures is that the previous experiments have been made with rays that were not long enough. For a wave-length of 7,000, which is in the visible red part of the spectrum, the corona is only eight tenths of a per cent brighter than the sky, he says. This is scarcely enough difference to permit a good picture. However, for infra-red light of 8,500, the corona is 1.7 per cent brighter than the sky, while at 9,500 it is 2.5 per cent brighter, which should be enough difference to permit a photograph to be made.

The difficulty comes in securing photographic plates sensitive to these longer waves. Ordinary plates are most sensitive to the blue, hence they are developed in red light. Special plates sensitized before use by immersion in a dye called neocyanin are most sensitive to light of wave-length of 8,000. Dr. Blunck tells of a new dye, called procyanol, that he has used, with which the plate can be sensitized to light at 8,500, and it is with these plates that his efforts have been successful.

Photographs made last year by Dr. Blunck show details that make them appear to be of the actual corona. As a test of his method, however, it has been suggested that the method might be tried at a partial eclipse of the sun, while the moon obscures part of the sun and part of the corona. If Dr. Blunck's method is really successful, then he should obtain on his plates the outline of the moon, even where it is not in front of the actual solar disc.

*Science News-Letter, March 24, 1928*

## The New Physics

*Physics*

In response to various inquiries as to where the reader can obtain information about the post-Einstein developments of physical theories with special reference to their bearing on philosophical, metaphysical and theological problems, Science Service suggests the following recent publications:

BRIDGMAN, P. W.—The Logic of Modern Physics. New York: Macmillan. 1927. $2.50.
DARROW, KARL D.—Introduction to Contemporary Physics. New York: Van Nostrand. 1926. $6.00.
HEYL, PAUL R.—Wave Mechanics, *Scientific Monthly*, Jan., 1928. The Inertia of Energy, *Sci. Monthly*, Oct., 1925. The Solid Ground of Nature, *Sci. Monthly*, July, 1927. The Present Status of the Theory of Relativity, *Sci. Monthly*, July, 1926.
LEWIS, G. N.—The Anatomy of Science. New Haven: Yale University Press. 1926. $3.00.
PUPIN, MICHAEL—The New Reformation. New York: Scribners. 1927. $2.50.
RUSSELL, BERTRAND—The Analysis of Matter. New York: Harcourt, Brace & Co. 1927. $6.00.
RUSSELL, BERTRAND—Philosophy. New York: Norton. 1927. $3.00.
WHITEHEAD, A. N.—Religion in the Making. New York: Macmillan. 1925. $3.00
WHITEHEAD, A. N.—Science and the Modern World. New York: Macmillan, 1925. $3.00.

*Science News-Letter, March 24, 1928*

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In tracing the careers of 100,000 automobiles, it was found that 5,000 of them had lasted 12 years.

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Over two-thirds of the fatal cases of measles occur in children under three years of age.

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Paintings on rocks, discovered in South Africa, bear a resemblance to the art of far away Egypt.

## Intermittent Time and Space

*Physics*

By Edwin E. Slosson

The opinion has often been expressed by philosophers and theologians that the reason why men of science were not bothered by the persistent problems of metaphysics was because scientists had accepted uncritically a superficial materialism and had not gone deep enough. Well, they are going deep enough now. Einstein and Planck, Schrödinger and Heisenberg, are forcing upon physics the fundamental questions that have been fought over for twenty-five centuries in the field of metaphysics.

In fact our traditional notions of time and space seem to be inadequate to fit the new facts. What can take their place it is too early to say. It seems to me a sort of motion picture philosophy. When you go to see the motion pictures you never see motion at all. You sit half the time gazing at a blank black screen. But sixteen times a second a still picture appears and you piece these together without noticing the blanks of time and space between and you call it continuity. The reason why the motion picture looks so much like the real world is because you see the real world in the same jerky fashion with unseen intervals between. You may think that you read a line of print continuously but you deceive yourself. You actually stop and look at a few words, and then you move on and stop to look at another group. Your conscious life is intermittent. Your consciousness is suspended every night for several hours, if you are a sound sleeper. The universe might be annihilated and regenerated without your knowing it not only while your eyes are shut at night, but also for briefer periods while they are open. So if a physicist of the future should call upon you to admit that the external world is merely a succession of events, and that time and space are not continuous but rather like dotted lines, you can calmly reply to him "That is how they have always seemed to me."

I mention this because people are inclined to take a fright at the strange ideas advanced by science and to take refuge from novelty in the older forms of thought to which they are accustomed. Jonathan Edwards says that in his day men were appalled by the thought of the immense distances of the stars disclosed by the telescope of Galileo and the theory of Newton, and, as he says, they "turn to the antiquated Ptolemy his system to ease their imaginations." So I think that it is mostly "to ease their imaginations" that many are now disposed to revolt against the new conceptions of physical science and to exclude Einstein as well as Darwin from the schools as dangerous to faith and morals. When the new ideas become customary they seem no longer absurd but more simple and natural than the traditional notions, and they turn out to be helpful rather than harmful.

*Science News-Letter, March 24, 1928*

# The Deluded Consumer

*Sociology*

F. J. Schlink, in an address before the National Retail Goods Association (printed by *Printers' Ink*):

The ultimate consumer, when he sallies forth to make a purchase, whether a new car or a pair of shoes, is facing problems of appalling difficulty, of which, fortunately for his peace of mind and yours, he is in the main only vaguely conscious. How can he tell which of the 400 brands of popular tooth-pastes, liquids and powders he should buy, or shoe polish, or floor wax? Will the right cake of soap give him a school-boy complexion? Does part wool mean the same to him as it does to the blanket trade?

His Government buys some $300,000,000 worth of supplies and equipment, from thumb tacks to battleships, but instead of buying on the basis of advertisements in four colors, and word pictures alluringly drawn by high-pressure salesmen, Government agents test the goods in a cool and dispassionate manner, with intricate instruments and the contents of many reagent bottles to give definiteness and objectivity to their judgments. For an estimated cost of $2,000,000 a year these experts on the staff of a single bureau in Washington save taxpayers something like $100,000,000 on Federal purchases.

The Government and the large private buyer, such as the railroads and other public utility corporations, are able through the technique of tests and standards to go into the market and get true competition on the actual properties and performance of all sorts of goods, divorced from the endless, colorful and entertaining assertions of advertising and salesmanship (which are, like as not, put forward by people who know little more about the actual and usable properties of a given product than does the wayfaring man who buys it). The taxpayer-consumer is justified in wondering whether this scientific approach to the problem of useful goods, and of the utility aspects of aesthetic goods, might not bring comparable savings if applied directly to the needs of himself and his family and the 90 per cent. of the population below the minimum health and decency income level computed by the Department of Labor.

On the other side of the industrial scene, he learns something of the technique of the advertiser; that "repetition is reputation," that the purpose of good advertising is "to take goods out of competition"; to make us buy the numerous things we don't want or have little use for, through the appeal of soaring words, alluring pictures, shiny packages, specious demonstrations, and intriguing arguments. These appeals often involve glaring irrelevancies, and the latest sensations of the pseudo-sciences; in a surprising proportion of cases, downright misrepresentation, detectable only by scientific specialists, is the definite technique employed.

The industrial machine is too complex for the consumer ever again to manufacture his own requirements on any significant scale, or ever personally to test the goods which he buys, except as to hefting a grapefruit or poking a thumb into the end of a cantaloupe. In time, he will and must depend upon the resources of technical experts of the Federal departments, the national standardizing bodies, and the progressive leaders of private industry, to put his purchases upon an economical and efficient basis, where facts have a chance to prevail and magic flies out the window.

# CLASSICS OF SCIENCE: Laws of Heredity

Biology
PART TWO

Part 1 of Mendel's Law of heredity was printed as the Classic of Science in the SCIENCE NEWS-LETTER last week. It contained the description of the experimental plants, the arrangement of the experiments and the form of the hybrids, explained so that the experiments, which Mendel performed, can be repeated in your own garden.

*EXPERIMENTS IN PLANT-HYBRIDIZATION, by Gregor Mendel, 1865; translation made for the Royal Horticultural Society and reprinted as an appendix to Mendel's Principles of Heredity, by William Bateson, M. A., F. R. S., V. M. H., Cambridge (England) 1909.*

### THE $F_2$ GENERATION

In this generation there reappear, together with the dominant characters, also the recessive ones with their peculiarities fully developed, and this occurs in the definitely expressed average proportion of three to one, so that among each four plants of this generation three display the dominant character and one the recessive. This relates without exception to all the characters which were investigated in the experiments. The angular wrinkled form of the seed, the green colour of the albumen, the white colour of the seed-coats and the flowers, the constrictions of the pods, the yellow colour of the unripe pod, of the stalk, of the caiyx, and of the leaf venation, the umbel-like form of the inflorescence, and the dwarfed stem, all reappear in the numerical proportion given, without any essential alteration. *Transitional forms were not observed in any experiment.*

Since the hybrids resulting from reciprocal crosses are formed alike and present no appreciable difference in their subsequent development, consquently the results [of the reciprocal crosses] can be reckoned together in each experiment. The relative numbers which were obtained for each pair of differentiating characters are as follows:

Expt. 1. Form of seed.—From 253 hybrids 7,324 seeds were obtained in the seconod trial year. Among them were 5,474 round or roundish ones aand 1,850 angular wrinkled ones. Therefrom the ratio 2:96 to 1 is deduced.

Expt. 2. Colour of albumen.—258 plants yielded 8,023 seeds, 6,022 yellow, and 2,001 green; their ratio, therefore, is as 3·01 to 1.

In these two experiments each pod yielded usually both kinds of seed. In well-developed pods which contained on the average six to nine seeds, it often happened that all the seeds were round (Expt. 1) or all yellow (Expt. 2); on the other hand there were never observed more than five wrinkled or five green ones in one pod. It appears to make no difference whether the pods are developed early or later in the hybrid or whether they spring from the main axis or from a lateral one. In some few plants only a few seeds developed in the first formed pods, and these possessed exclusively one of the two characters, but in the subsequently developed pods the normal proportions were maintained nevertheless. . . .

As extremes in the distribution of the two seed characters in one plant, there were observed in Expt. 1 an instance of 43 round and only 2 angular, and another of 14 round and 15 angular seeds. In Expt. 2 there was a case of 32 yellow and only 1 green seed, but also one of 20 yellow and 19 green.

These two experiments are important for the determination of the average ratios, because with a smaller number of experimental plants they show that very considerable fluctuations may occur. In counting the seeds, also, especially in Expt. 2, some care is requisite, since in some of the seeds of many plants the green colour of the albumen is less developed, and at first may be easily overlooked. The cause of this partial disappearance of the green colouring has no connection with the hybrid-character of the plants, as it likewise occurs in the parental variety. This peculiarity [bleaching] is also confined to the individual and is not inherited by the offspring. In luxuriant plants this appearance was frequently noted. Seeds which are damaged by insects during their development often vary in colour and form, but, with a little practice in sorting, errors are easily avoided. It is almost superfluous to mention that the pods must remain on the plants until they are thoroughly ripened and have become dried, since it is only then that the shape and colour of the seed are fully developed. . . .

If now the results of the whole of the experiments be brought together, there is found, as between the number of forms with the dominant and recessive characters, an average ratio of 2·98 to 1, or 3 to 1.

The dominant character can have here a *double signification*—viz. that of a parental character, or a hybrid-character. In which of the two significations it appears in each separate case can only be determined by the following generation. As a parental character it must pass over unchanged to the whole of the offspring; as a hybrid-character, on the other hand, it must maintain the same behaviour as in the first generation. [$F_2$].

### THE $F_3$ GENERATION

Those forms which in the first generation [$F_2$] exhibit the recessive character do not further vary in the second generation [$F_3$] as regards this character; they remain constant in their offspring.

It is otherwise with those which possess the dominant character in the first generation [bred from the hybrids]. Of these *two*-thirds yield offspring which display the dominant and recessive characters in the proportion of 3 to 1, and thereby show exactly the same ratio as the hybrid forms, while only *one*-third remains with the dominant character constant. . . .

In each of these experiments a certain number of the plants came constant with the dominant character. For the determination of the proportion in which the separation of the forms with the constantly persistent character results, the two first experiments are of especial importance, since in these a larger number of plants can be compared. The ratios 1·93 to 1 and 2·13 to 1 gave together almost exactly the average ratio of 2 to 1. The sixth experiment gave a quite corcordant result; in the others the ratio varies more or less, as was only to be expected in view of the smaller number of 100 trial plants. Experiment 5, which shows the greatest departure, was repeated, and then, in lieu of the ratio of 60 and 40, that of 65 and 35 resulted. *The average ratio of 2 to 1 appears, therefore, as fixed with certainty.* It is therefore demonstrated that, of those forms which possess the dominant character in the first generation, two-thirds have the hybrid-character, while one-third remains constant with the dominant character.

The ratio of 3 to 1, in accordance with which the distribution of the dominant and recessive characters results in the first generation, resolves itself therefore in all experiments into the ratio of 2 : 1 : 1 (*Turn the page*)

# Mendel—*Continued*

if the dominating character be differentiated according to its significance as a hybrid-character or as a parental one. Since the members of the first generation [$F_2$] spring directly from the seed of the hybrids [$F_1$], *it is now clear that the hybrids form seeds having one or other of the two differentiating characters, and of these one-half develop again the hybrid form, while the other half yield plants which remain constant and receive the dominant or the recessive characters* [*respectively*] *in equal numbers.*

### Subsequent Generations

The proportions in which the descendants of the hybrids develop and split up in the first and second generations presumably hold good for all subsequent progeny. Experiments 1 and 2 have already been carried through six generations, 3 and 7 through five, and 4, 5, and 6 through four, these experiments being continued from the third generation with a small number of plants, and no departure from the rule has been perceptible. The offspring of the hybrids separated in each generation in the ratio of 2 : 1 : 1 into hybrids and constant forms.

If *A* be taken as denoting one of the two constant characters, for instance the dominant, *a*, the recessive, and *Aa* the hybrid form in which both are conjoined, the expression

$$A + 2Aa + a$$

shows the terms in the series for the progeny of the hybrids of two differentiating characters.

The observation made by Gärtner, Kölreuter, and others, that hybrids are inclined to revert to the parental forms, is also confirmed by the experiments described. It is seen that the number of the hybrids which arise from one fertilisation, as compared with the number of forms which become constant, and their progeny from generation to generation, is continually diminishing, but that nevertheless they could not entirely disappear. If an average equality of fertility in all plants in all generations be assumed, and if, furthermore, each hybrid forms seed of which one-half yields hybrids again, while the other half is constant to both characters in equal proportions, the ratio of numbers for the offspring in each generation is seen by the following summary, in which *A* and *a* denote again the two parental characters, and *Aa* the hybrid forms. For brevity's sake it may be assumed that each plant in each generation furnishes only 4 seeds.

| Generation | *A* | *Aa* | *a* | Ratios *A* : *Aa* : *a* |
|---|---|---|---|---|
| 1 | 1 | 2 | 1 | 1 : 2 : 1 |
| 2 | 6 | 4 | 6 | 3 : 2 : 3 |
| 3 | 28 | 8 | 28 | 7 : 2 : 7 |
| 4 | 120 | 16 | 120 | 15 : 2 : 15 |
| 5 | 496 | 32 | 496 | 31 : 2 : 31 |
| *n* | | | | $2n - 1$ : 2 : $2n - 1$ |

In the tenth generation, for instance, $2n - 1 = 1023$. There result, therefore, in each 2,048 plants which arise in this generation 1,023 with the constant dominant character, 1,023 with the recessive character, and only two hybrids.

### Several Diverse Characters

In the experiments above described plants were used which differed only in one essential character. The next task consisted in ascertaining whether the law of development discovered in these applied to each pair of differentiating characters when several diverse characters are united in the hybrid by crossing. As regards the form of the hybrids in these cases, the experiments showed throughout that this invariably more nearly approaches to that one of the two parental plants which possesses the greater number of dominant characters. If, for instance, the seed plant has a short stem, terminal white flowers, and simply inflated pods; the pollen plant, on the other hand, a long stem, violet-red flowers distributed along the stem, and constricted pods; the hybrid resembles the seed parent only in the form of the pod; in the other characters it agrees with the pollen parent. Should one of the two parental types possess only dominant characters, then the hybrid is scarcely or not at all distinguishable from it. . . .

There is . . . no doubt that for the whole of the characters involved in the experiments the principle applies that *the offspring of the hybrids in which several essentially different characters are combined exhibit the terms of a series of combinations, in which the developmental series for each pair of differentiating characters are united.* It is demonstrated at the same time that *the relation of each pair of different characters in hybrid union is independent of the other differences in two original parental stocks.*

If *n* represent the number of the differentiating characters in the two original stocks, $3^n$ gives the number of terms of the combination series, $4^n$ the number of individuals which belong to the series, and $2^n$ the number of unions which remain constant. The series therefore contains, if the original stocks differ in four characters, $3^4 = 81$ classes, $4^4 = 256$ individuals, and $2^4 = 16$ constant forms; or, which is the same, among each 256 offspring of the hybrids there are 81 different combinations, 16 of which are constant.

All constant combinations which in Peas are possible by the combination of the said seven differentiating characters were actually obtained by repeated crossing. Their number is given by $2^7 = 128$. Thereby is simultaneously given the practical proof *that the constant characters which appear in the several varieties of a group of plants may be obtained in all the associations which are possible according to the* [*mathematical*] *laws of combination, by means of repeated artificial fertilisation.*

**Gregor Johann Mendel** was born July 22, 1822, at Heinzendorf in Austrian Silesia, and died at Brünn January 6, 1884. His family was of peasant stock, and quite poor, but the boy's intellectual capacity was early recognized, and, at considerable sacrifice, they sent him to Leipnik to school at the age of eleven. From there he went to the gymnasium at Troppau, and finished with a year at Olmütz. He then became a candidate for admission to the Königskloster of Augustinian monks at Brünn. He was ordained as a priest in 1847, at the age of 25. From 1851 to 1853 the Königskloster sent Mendel to the University of Vienna, where he studied mathematics, physics and the natural sciences. Upon his return to Brünn he taught until, in 1868, he was elected Prälat of the Königskloster. His experiments in science were made before the latter date, for he became so involved in matters pertaining to the monastery, especially in protest against government taxes which he believed unjust, that he was forced to put aside his scientific work.

Mendel's laws of heredity were announced after eight years of experiment in 1865, when the author was 43 years old. The paper was published the next year by the local society before which it was read, but, although copies of it reached most of the great scientific societies of Europe, no notice was taken at the time of the revolutionary principles it contained. The paper was rediscovered and appreciated by Hugo de Vries in 1900.

*Science News-Letter, March 24, 1928*

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One type of the prehistoric dinosaurs was able to renew its teeth continually as they wore out, and had a reserve of about 400 teeth in its lower jaw alone.

*MR. COLLINS, shown as he discovered several of the skulls of the Calusa Indians, near Fort Myers*

# Prehistoric Skulls from Florida

*Anthropology*

Prehistoric inhabitants of southern Florida may not have known the fountain of youth that the Spaniards sought in Florida, but they were an extraordinarily healthy lot, judging by bones which have been taken from a burial mound near Ft. Myers. Only one diseased bone was found in the mound, according to Henry B. Collins, Jr., anthropologist of the U. S. National Museum, who excavated at the site.

Mr. Collins has just returned to Washington with 80 skulls from this mound. The skulls are pronounced those of the famous Calusa Indians, the tribe which first greeted Ponce de Leon and routed the youth-seeking Spaniard with a shower of arrows. The Calusa had the reputation of being cannibals and fierce warriors, but they were among the first Indians to be wiped out by the white man, and by the time of the American Revolution they were practically extinct.

"Remains of these extinct Indians have been extremely rare, and very little has been known about them," said Mr. Collins, in describing his expedition. "The skulls show that the Calusa were not particularly large or powerfully built people, as were tribes of northern Florida."

A strange discovery from the mound was that only half a dozen of the 80 burials were children. Whether this means that these Indians were more successful than most tribes in raising their children, or whether babies who did not survive were disposed of in some other way, cannot be determined, Mr. Collins said.

No Indian possessions were found in the burial mound, with the exception of some fragments of pottery. These broken pieces of pots and jars had been stuck in the ground all around the heads of most of the Indians, probably with some magic rite.

The burial mound was outlined by a border of conch shells over two feet wide, the white shells making a sharp contrast against the black muck of the mangrove swamp. Further excavations were made in a number of large shell heaps, some of them 30 feet high, by Mr. Collins, but these kitchen dumps of the Calusa revealed no traces of cannibalism or other unusual practices.

*Science News-Letter, March 24, 1928*

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The economic loss from automobile accidents figured in terms of persons killed and injured totals almost three billion dollars in the past five years.

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Footprints on bricks found during excavations at Beisan are said to be the prints of a child five years old who walked across the soft, half dried brick 3,000 years ago.

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As a result of the war, Great Britain expects within the next few years a noticeable decrease in boys and girls of 14 to 18 years, at which ages young people begin entering industry.

# Religion Beyond Science

*Psychology*

The efforts of psychic researchers, who are attempting a "scientific" proof of the existence of the "other world" would, if successful, destroy religion, thinks Dr. Knight Dunlap, professor of psychology at Johns Hopkins University. Dr. Dunlap, however, said emphatically that he does not think there is the remotest chance of their success.

The three fundamental religious ideas of God, freedom and immortality will forever remain articles of faith, devoid of any relation to science or positive proof, he declared.

"Religion is based on faith which is founded on desire," Dr. Dunlap stated. "It can be understood, therefore, only by a patient analysis of man's desires. Religion, however, is not based on sex desire or any other single phase of life, but on man's whole system of struggle."

Taking issue with psychoanalytic views, Dr. Dunlap declared that sex desire plays only a relatively small part in the development of religion.

"Too much attention has been paid to the abnormal phases of religion, such as revivals, conversion and epileptic or hysterical phenomena," the psychologist said. "These can be understood only by the knowledge of the religious life of ordinary people."

*Science News-Letter, March 24, 1928*

# Rice Hulls Help Roads

*Engineering*

In addition to being an excellent health builder, rice is now giving assistance to the road builder.

A California contractor, engaged in grading and bituminous macadam surfacing roads in Alameda County, has had difficulty in hauling wet materials. Certain soils and clays are more or less tenacious upon absorbing a small quantity of water, and although they pass through the bucket of the power excavating equipment without great difficulty, when loaded on trucks and transported any distance the load often has to be re-excavated by hand before it will discharge.

The ingenious California contractor has overcome this difficulty by dusting the beds of the truck with rice hulls between each load. This light covering is sufficient to start the load and it discharges readily when the truck is raised. The hulls are a waste product at California rice mills and are secured for the trouble of hauling them away.

*Science News-Letter, March 24, 1928*

The twilight beetle, discovered on Long Island in 1923, apparently came from Japan and, though it is not yet notorious, scientists say it is spreading rapidly and may become a national pest.


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## Airplanes—*Continued*

young British aeronautical engineer, Capt. G. T. R. Hill, was fortunate enough to win a scholarship that gave him the opportunity of studying airplanes and how they are built. In a quiet retreat in rural England he spent months of figuring, drawing and thinking. Then at a remote spot on the South Downs he built a glider that embodied his ideas. Unconventional, tailless, with spread wings, it came to look like the extinct lizards he had read about in his geology books. Affectionately he named his creation "Pterodactyl," after those ancient flying lizards.

The pterodactyl glider, after demonstrating the soundness of Captain Hill's design, metamorphosed into an engined tailless airplane that attracted wide aeronautical interest. It flies without stalling. It is lighter in construction than the ordinary plane. "Controllers" on the wingtips perform the functions of elevators and ailerons. It is a new breed of aircraft. Perhaps further trials will show it worthy of starting a new aeronautical fashion, or it may not survive in the fierce competition for better airplanes.

Bidding for a place in the air is another queer-looking craft, a sort of flying vertical windmill. This is the autogiro, the invention of Senor Juan de la Cierva, a Spanish engineer. Some have called it a helicopter, but it is not. It is essentially an airplane with revolving wings and it flies like an ordinary airplane, not straight up as a helicopter is supposed to. The first of the autogiros were built in 1919, and since then over thirty machines have been constructed and flown. Flights of considerable length have been completed, and many engineers predict that this type of machine, embodying new principles, has a real future before it. Others feel that the standard design of airplanes, improved by further research, will match the autogiros' performance.

Replacing the ordinary wing structure, there is a four-bladed gigantic windmill-like revolving wing. This is free to revolve and is not powered in any way. It is whirled very slowly during flight by the relative wind. In other respects, the craft is built much like an ordinary airplane. The revolving wings give it the advantage of being free from sudden or violent stall and a slower safe landing speed. Although the autogiro cannot be built to attain as great speed as the (*Turn the page*)

# California Fights to Save Fig Crop

*Botany*

Warfare against a plant disease that threatens California's huge fig industry is being waged on a most unique scheme of campaign. It all centers around keeping a certain small insect, a little wasp no bigger than a gnat, aseptically clean. If the fig-wasp can be kept clean the figs will be saved.

This tiny wasp, called Blastophaga by scientists, looms so large in the fig business because she is the only creature that can pollinate the Smyrna fig, which is the most valuable variety in California. The Smyrna fig, being exclusively female, produces no pollen itself, and the wasp is depended on to transfer pollen to it from an exclusively male fig variety, known as the "caprifig," which produces inedible fruits but plenty of good pollen.

The Blastophaga wasps breed only in the fruits of the caprifig, and emerge from them as adult insects covered with pollen. Fig growers fasten caprifig branches in their Smyrna trees, and the wasps, attempting to enter the immature Smyrna figs, accomplish their fertilization. The resulting seeds in the Smyrna figs give them their special value and the medical properties which are claimed for them.

Thus for many years the little fig-wasp has been a vital factor in the prosperity of California fig growers. Now she threatens to be the agent of their ruin, because a serious outbreak of a brown-rot disease has occurred among the figs, and the fig-wasp has been shown to be the unwitting carrier of its germs. Every fig she pollinates she also infects with the virus of destruction, for the pollen-providng caprifigs are infected, and the wasp carries off the infection when it carries off the pollen.

To break this vicious circle a drastic and elaborate clean-up campaign has been necessary. Instead of letting the fig-wasp breed and over-winter in its natural way, the stock of insects that are to fertilize this year's crop has been concentrated in a newly built "insectary" near Fresno, and fig-growers have been required to ship every single caprifig fruit here. Millions of insects, in tons of caprifigs, have been assembled.

The wasps are brought out of their over-wintering condition in special incubators, and are allowed access to the caprifig pollen only after the fruits containing it have been carefully sterilized to kill the brown-rot germs. Then the wasps are induced to enter special mailing tubes which are sent to the fig growers. Released in the orchards, the little pollen-carrying insects proceed to the Smyrna fig flowers and complete their fertilization.

State officers inspect all orchards to see that no caprifig fruits, containing possible infection, are left on the trees. If the clean-up campaign can be made 100 per cent. complete for a few years it is believed that the disease will be completely stamped out.

*Science News-Letter, March 24, 1928*

# Bad Spelling Reveals Language

*Archæology*

Bad spelling on tombstones in the Jewish catacombs of Rome indicates how the Jews who lived in Rome in the early Christian centuries pronounced Greek and Latin, according to Dr. Harry J. Leon, of the University of Texas.

Scholars have wondered whether the Jews who formed a settlement in Rome clung to their Hebrew ways or whether they did as the Romans did, Dr. Leon explains. Six Roman catacombs where the Jewish residents buried their dead are now known, and study of the inscriptions on the slabs and the gallery walls show that the writing is three-fourths Greek and one-fourth Latin. Often words in the inscriptions are confused with other words of similar sound, so that they are misspelled in characteristic ways.

Jewish ritualistic symbols on the tombstones are significant evidence that the epitaphs on the underground tombs were indeed written by Jewish people, using foreign languages, Dr. Leon points out.

The Jewish population in Rome, which grew to about 40,000, was no more familiar with the Hebrew language than the average Jew of today. The more cultured among them spoke Latin as well as the popular Greek, the recent investigations indicate. Their inscriptions afford valuable material in tracing the history of the Greek and Latin languages in their development from the classical tongues of antiquity to the modern Greek and the Romance Languages of our day, Dr. Leon states.

*Science News-Letter, March 24, 1928*

## Airplanes—*Continued*

ordinary type airplane, its other advantages may make it useful.

Such heavier-than-air flying craft embodying the newest ideas of aeronautics will be among those entered in an air contest that has safety rather than speed or endurance as its objective. The Daniel Guggenheim Safe Aircraft Competition, sponsored by the Daniel Guggenheim Fund for the Promotion of Aeronautics, has set standards of performance that are spurring foreign and American manufacturers to their best efforts. The contest is to be open until October, 1929, and some $150,000 in prizes are offered. The minimum performance that can win a prize is: A speed of 35 to 110 miles per hour; glide for three minutes at an air speed of not more than 36 miles per hour; land in not over 100 feet; land over a 35-foot obstacle and come to rest in not more than 300 feet; take off in not more than 300 feet and clear 35-foot obstacle from a standing start at distance of not more than 500 feet. Today no commercial airplane can satisfy these requirements.

Now that the days of wonder at airplanes are past, now that we send an air-mail letter for a dime, purchase a pleasure ride for a dollar or two, and expect airplanes to hop off for foreign ports daily, the principal question about flying is:

"Are airplanes safe?"

Enthusiasts quote mileage figures that should convince the doubter that it is just as safe to fly as to ride in an automobile or on a train. For instance, the British air transport services during seven years had only four accidents involving the death of passengers in flying 5,000,000 miles. The 54 German air lines, in 1926, carried 56,268 passengers and 1,680,000 pounds of mail, freight and baggage, a total of 6,838,425 miles with only one fatal accident. Even more impressive figures demonstrate the safety of army and navy flying in the United States.

But airmen and aeronautic experts admit that airplanes are not as safe as they can be made. They see in the airplanes that are now flown successfully inherent faults and shortcomings. And since they believe that these qualities of the airplane can be improved, they are working, in wind-tunnels and laboratories, at aviation fields and in factories to produce airplanes that are stable, safe, and yet easy to fly.

## NATURE RAMBLINGS

By FRANK THONE

*Natural History*

**Ratel**

Most animals, even the formidable predatories that are well able to look out for themselves in a fight, are darker colored above than they are beneath, as though to blend into the general color-scheme of the landscape. But the Ratel, the African equivalent of our American badger, defiantly reverses this all but universal natural camouflage, and wears a broad mantle of light gray over the top of his head and clear down his wide back.

It may be that this should be considered an example of what naturalists sometimes call "warning coloration," for the ratel, like the badger, is one squat, powerful, trundling package of truculence. He goes about his business on his four short legs at a hard trot, following his nose undeviatingly and yielding the road to nobody whatever. With him the old warning *cave canem* is reversed to *caveat canis*: he will beware of no dog; let the dog rather beware of him. And that goes for hyena and jackal and snake as well. Highly efficient teeth and claws backed by powerful muscles, with all but impenetrable hair as an armor, will make the defiance good against all comers.

Like many another dour and doughty fighter, the ratel has a most ridiculously sweet tooth. He feeds on insects and eggs and small animal life of all sorts as a routine matter, but let him get sight or scent of a bee tree and he forsakes all else to attack it. He rips into the rotten wood with powerful claws, regardless of the furious but ineffective attacks of the enraged insects, and proceeds to gorge himself on the comb and the succulent masses of bee larvae within.

*Science News-Letter, March 24, 1928*

# Firemen Revive Babies

*Physiology*

The time-honored custom of spanking a new-born baby who fails to cry and so start his breathing apparatus to working, is all wrong, according to modern physiology.

Such methods are not only ineffective but positively harmful, in the estimation of Dr. Yandell Henderson of the laboratory of applied physiology at the Sheffield Scientific School of Yale University.

"Resuscitation of the new-born should be based on the modern conception of the regulation of respiration by the action of the blood gases on the respiratory center," declared Dr. Henderson in a severe indictment of the traditional technique for resuscitating babies reported to the American Medical Association. A baby's failure to cry, the physiologist explained, is due to prolonged pressure on the respiratory center in the brain received during birth. When he has taken an unduly long time to be born it requires chemical stimulation of that part of the brain that controls breathing to start this necessary life process. The natural stimulant of the respiratory center is the carbon dioxide carried to the brain by the blood. Consequently, the logical procedure is to supply carbon dioxide mixed with the oxygen needful to all higher animals, by means of an inhalator. The principle upon which such an apparatus is based is exceedingly simple, Dr. Henderson continued, so that there is no reason why an infant's inhalator could not be made that would slip easily into a physician's overcoat pocket.

The use of inhalators in resuscitating babies has already seen considerable practice, Dr. Henderson pointed out, by the rescue squads of city fire departments. Hospitals confronted with an emergency when the usual methods have failed call on the rescue squad who come in with their inhalators and start the baby breathing. The fire department of one city now reports a large number of such "rescues" in little more than a year, the scientist declared.

The way in which this has come about can usually be traced to some physician who has witnessed the effective rescue of a gas asphyxiation case by the inhalators of the fire department. Some time thereafter he delivers a baby that cannot be made to breathe by all the ancient practices, and he calls the fire department. If the latter succeeds where he has failed, as frequently happens, he calls them again the next time.

"Now the hospitals in some cities," added Dr. Henderson, "are adopting the practice of calling for the inhalator of the fire department whenever they have a baby who breathes poorly. In effect, they add the rescue crew of the fire department to their board of consultants. Obviously, it is the hospitals that should be equipped to treat asphyxia—asphyxia of every form—and thus to help firemen overcome by gas and smoke, instead of relying on the fire department to help the hospital in such a matter as asphyxia of the new-born.

"It is certainly an unfavorable comment on the art of midwifery that obstetricians do not as yet seem to have availed themselves of an acquaintance with the modern physiology of respiration or have provided themselves with the simple means necessary for putting it into effect. From such estimates as I can obtain, this apparatus would make a difference of one life in a hundred, and it must be kept in mind that birth is a hazard through which all must pass. Thus, if this estimate is correct, the total number of lives to be saved by the introduction of such simple and easily practicable means would be greater than would result from the complete elimination of some of the diseases of infancy and childhood, such as poliomyelitis and epidemic encephalitis."

*Science News-Letter, March 24, 1928*

# Ancient Salt Mines

*Archæology*

Salt mines that were operated on an extensive scale, with very "modern" shafts, tunnels and drifts, more than 500 years before Christ, have lately been explored near Hallstadt, Austria, by Adolph Mahr of the Vienna State Museum. In addition to knowledge of the mining methods of these prehistoric men of the early Iron Age, the exploration yielded also numerous articles of leather and wood, well preserved against decay during the ages by their burial in salt. These finds included pick handles, torches, wedges, mine timbers, felt caps, shoes of wood, leather and felt, leather hand-protectors and many other articles.

The exploration was backed by two Americans, Prof. F. W. Bade of the University of California and Major Gotshall.

*Science News-Letter, March 24, 1928*

# How to Use Index Word Feature

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110 Metaphysics
120 Special metaphysical topics
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140 Philosophical systems
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160 Logic
170 Ethics
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190 Modern philosophers
200 RELIGION—
210 Natural theology
220 Bible
230 Doctrinal. Dogmatics. Theology
240 Devotional. Practical
250 Homiletic. Pastoral. Parochial
260 Church. Institutions. Work
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480 Greek
490 Minor Languages
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520 Astronomy
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540 Chemistry
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570 Biology
580 Botany
590 Zoology
600 USEFUL ARTS—
610 Medicine
620 Engineering
630 Agriculture
640 Domestic economy
650 Communication. Commerce
660 Chemical technology
670 Manufactures
680 Mechanic trades
690 Building
700 FINE ARTS—
710 Landscape gardening
720 Architecture
730 Sculpture
740 Drawing. Decoration. Design
750 Painting
760 Engraving
770 Photography
780 Music
790 Amusement
800 LITERATURE—
810 American
820 English
830 German
840 French
850 Italian
860 Spanish
870 Latin
880 Greek
890 Minor languages
900 HISTORY—
910 Geography and travels
920 Biography
930 Ancient history
Modern
940 Europe
950 Asia
960 Africa
970 North America
980 South America
990 Oceanic and polar regions

# FIRST GLANCES AT NEW BOOKS

CHILDBIRTH—William George Lee—*University of Chicago Press.* A surprising amount of the force and energy of the author's personal conviction of the need for good obstetrics has gone into this new and needed textbook on the universal process of birth. Unremitting care, minute observation, thorough technique and balanced judgment are the points Dr. Lee would drive home to students who would enter this much taken-for-granted field of medicine. Nothing could be more damning than the biting indictment, "early neglect," contained in his directions for procedures in acute cases where needless suffering has been caused by lack of proper oversight.

*Medicine*
*Science News-Letter, March 24, 1928*

NATURAL HISTORY: ANIMALS—George Jennison—*Macmillan* ($4.50) Since the old Cambridge Natural History nothing so complete and authoritative on the mammals has appeared. Its information is concise, yet covers all essential points. Its popular appeal is much enhanced by the numerous illustrations; every species discussed has its photograph, and there are in addition sixteen beautiful colored plates.

*Zoology*
*Science News-Letter, March 24, 1928*

PREDATORY AND FUR-BEARING ANIMALS OF YELLOWSTONE NATIONAL PARK—Milton P. Skinner—*Roosevelt Wild Life Bulletin.* A survey of the wild life of the area that is the oldest and greatest of our national game preserves as well as the oldest and greatest of our national parks. The author disagrees with the policy of complete extermination practiced against some of the predatory animals.

*Zoology*
*Science News-Letter, March 24, 1928*

THE BEAVER IN THE ADIRONDACKS—Charles Eugene Johnson—*Roosevelt Wild Life Bulletin.* The return of the wild beaver, the rise of beaver "farming," the defense of this interesting animal against detractors, and a general discussion of its biology and ecology, are concisely but adequately set forth.

*Zoology*
*Science News-Letter, March 24, 1928*

ECONOMIC INSTITUTIONS—Willard L. Thorn—*Macmillan* ($1.50). A brief survey of our institutions, and the methods that have been used, and proposed, of dealing with them.

*Sociology*
*Science News-Letter, March 24, 1928*

A GUIDE TO THE CONSTELLATIONS—Samuel G. Barton and William H. Barton—*McGraw-Hill* ($2.50). Astronomers, teachers and students have long recognized the need for a thorough and up-to-date book on the constellations to serve as a guide to what can be seen in them with the naked eye. In this book they will find what they have sought. The charts, which are particularly well printed, show the aspect of the heavens at monthly intervals. Since the authors have made allowance for atmospheric absorbtion near the horizon, they only show what can actually be seen. The text is complete, yet concise, and a copious index makes it easy for the student of the stars to find the answer to most of his questions.

*Astronomy*
*Science News-Letter, March 24, 1928*

1001 CELESTIAL WONDERS—Charles Edward Barns—*Pacific Science Press* (Morgan Hill, Cal.) ($2.50). This is easily the best available guide book to the heavenly sights that are within the reach of a small telescope. But more than that, it contains full directions for the construction and use of telescopes, both reflecting and refracting, illustrations reproducing some of the finest pictures of celestial objects, and all sorts of interesting astronomical information. The book is unique because the author has set up the type himself at the case, and personally printed it, so that from every angle it reflects his individuality.

*Astronomy*
*Science News-Letter, March 24, 1928*

A TROUT SURVEY OF ALLEGANY STATE PARK—William C. Kendall and Wilford A. Dence—*Roosevelt Wild Life Bulletin.* A detailed examination of the fish life in one of the most noted of American State Parks.

*Ichthyology*
*Science News-Letter, March 24, 1928*

COLLOID SYMPOSIUM MONOGRAPH—Edited by Harry Boyer Weiser—*Chemical Catalog* ($6.50). Papers presented at the fifth national symposium on colloid chemistry at the University of Michigan in June, 1927; thereby constituting the latest news in its field, which all chemists are bound to desire.

*Chemistry*
*Science News-Letter, March 24, 1928*

THE POINT OF VIEW—Edited by Catherine Cook—*Open Court* ($2.50). An anthology of religion and philosophy selected from the works of Paul Carus.

*Philosophy*
*Science News-Letter, March 24, 1928*

TIGERS, GOLD, AND WITCH-DOCTORS—Bassett Digby—*Harcourt, Brace* ($3.50). Strange beings and doings in central Siberia, with notes on things like them sometimes found in the *Abendland.* No academic formality is observed in the arrangement of material, but ethnology, geography, natural history and all sorts of other things are all mixed up together in a most meaty pot pie.

*Travel*
*Science News-Letter, March 24, 1928*

HEATING AND LIGHTING UTENSILS IN THE U. S. NATIONAL MUSEUM—By Walter Hough—Smithsonian Inst. Bull. 141—*Government Printing Office.* A thoroughly interesting government bulletin describing the thousand or more specimens in the museum collection. Antique hounds will take great joy in the numerous plates of candlesticks, molds, snuffers, old lamps and what not.

*Archæology*
*Science News-Letter, March 24, 1928*

FIRST REPORT OF THE PREHISTORIC SURVEY EXPEDITION—K. S. Sandford and W. J. Arkell—*Univ. of Chicago Press* ($1). The first comprehensive survey of prehistoric man's development in Egypt. Mr. Sandford reports finding different types of stone implements in the terraced banks of the Nile, and these tools and weapons of the prehistoric Egyptians indicate a progress of culture quite similar to man's development in Europe. In view of the changes in the River Nile and its valley since the earliest of the flints were cast aside by primitive men, the conclusion is reached that man's existence in Egypt goes back to a time of very great antiquity.

*Archæology*
*Science News-Letter, March 24, 1928*

FOREST FIRES IN MINNESOTA—J. A. Mitchell—*Forest Service, State of Minnesota.* This booklet attacks the forest fire problem from a multitude of angles. It might well serve as a model for similar surveys in other states.

*Forestry*
*Science News-Letter, March 24, 1928*

AMERICAN PROSPERITY—Paul M. Mazur—*Viking Press* ($2.50). A study of the economic forces which have given the United States a larger income than any other country ever enjoyed. Free from statistics and technicalities. Useful equally to economists and business men.

*Economics*
*Science News-Letter, March 24, 1928*

# A Statement of Purpose

(The aims, ideals and aspirations of an institution)

SCIENCE SERVICE is a unique institution, established at Washington for the purpose of disseminating scientific information to the public. It aims to act as a sort of liaison agency between scientific circles and the world at large. It interprets original research and reports the meetings of learned societies in a way to enlighten the layman. The specialist is likewise a layman in every science except his own and he, too, needs to have new things explained to him in non-technical language. Scientific progress is so rapid and revolutionary nowadays that no one can keep up with it from what he learned at school. Science Service endeavors to provide life-continuation courses in all the sciences for newspaper readers anywhere in America without tuition fees or entrance examinations.

In a democracy like ours it is particularly important that the people as a whole should so far as possible understand the aims and achievements of modern science, not only because of the value of such knowledge to themselves but because research directly or indirectly depends upon popular appreciation of its methods. In fact the success of democratic institutions, as well as the prosperity of the individual, may be said to depend upon the ability of people to distinguish between science and fakes, bewteen the genuine expert and the pretender.

Science Service spares no pains or expense in the endeavor (1) to get the best possible quality of popular science writing and (2) to get it to the largest possible number of readers. If in doing this it can make both ends meet, so much the better. If not, it will do it anyway.

Through the generosity of E. W. Scripps, Science Service has been assured of such financial support as to insure its independence and permanence. Mr. Scripps's long and wide experience as a newspaper editor and proprietor had convinced him of the importance of scientific research as the foundation of the prosperity of the nation and as guide to sound thinking and living and he realized the need for an independent agency that would bring the results of research to the attention of the entire people so these could be applied to the solution of their personal, social or political problems.

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